

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
29 December 2005 (29.12.2005)

PCT

(10) International Publication Number  
**WO 2005/124259 A1**

(51) International Patent Classification<sup>7</sup>: F28F 9/02,  
F25B 1/00, 39/02, F28F 21/08

(21) International Application Number:  
PCT/JP2005/011399

(22) International Filing Date: 15 June 2005 (15.06.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
2004-176474 15 June 2004 (15.06.2004) JP  
60/580,718 21 June 2004 (21.06.2004) US  
2005-061853 7 March 2005 (07.03.2005) JP  
60/659,902 10 March 2005 (10.03.2005) US

(71) Applicant (for all designated States except US): **SHOWA DENKO K.K.** [JP/JP]; 13-9, Shiba Daimon 1-chome, Minato-ku, Tokyo, 1058518 (JP).

(72) Inventors; and

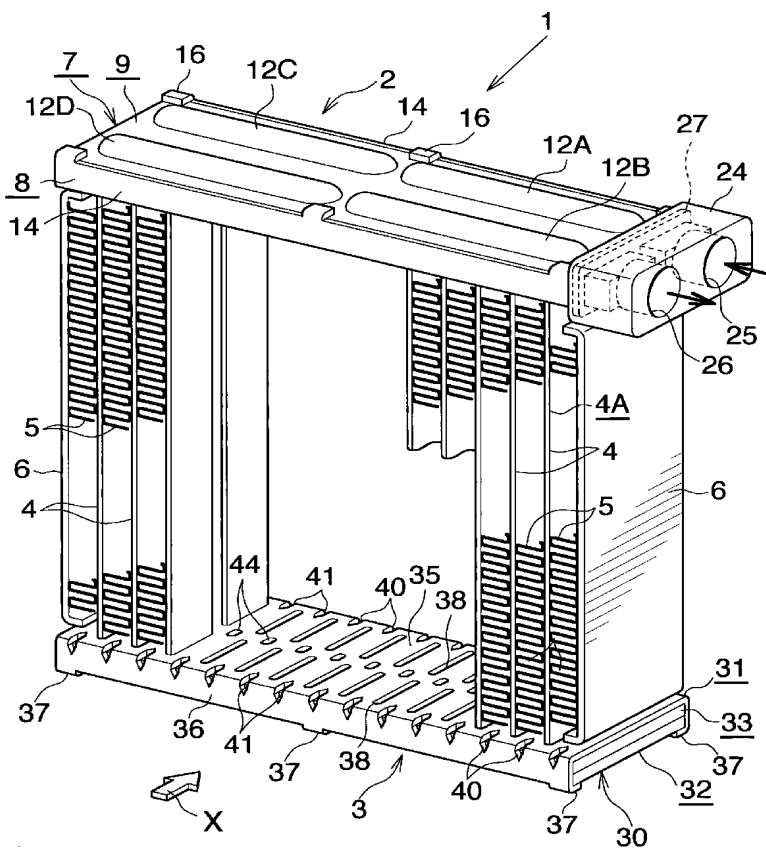
(75) Inventors/Applicants (for US only): **ICHIYANAGI, Shigeharu** [JP/JP]; c/o SHOWA DENKO K.K., OYAMA REGIONAL OFFICE, 480, Inuzuka 1-chome, Oyama-shi, Tochigi, 3238678 (JP). **HIGASHIYAMA, Naohisa** [JP/JP]; c/o SHOWA DENKO K.K., OYAMA REGIONAL OFFICE, 480, Inuzuka 1-chome, Oyama-shi, Tochigi, 3238678 (JP).

(74) Agents: **HIBI, Norihiko** et al.; c/o KISHIMOTO & CO., 3rd Floor, Inaba Building, 13-18, Nishishinsaibashi 1-chome, Chuo-ku, Osaka-shi, Osaka 5420086 (JP).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM,

[Continued on next page]

(54) Title: HEAT EXCHANGER



(57) Abstract: An evaporator 1 comprises a pair of header tanks 2, 3 arranged one above the other at a spacing, a plurality of heat exchange tubes 4 arranged in parallel between the pair of header tanks 2, 3 and having opposite ends joined to the respective header tanks 2, 3, and fins 5 arranged between respective left-to-right adjacent pairs of heat exchange tubes 4. The lower header tank 3 comprises a tank forming member 30 and a tube connecting plate 31 joined to the tank forming member 30. The tube connecting plate 31 has a plurality of drain guides 40 arranged at a spacing in a left-right direction. The drain guides 40 each comprise a cutout portion 41 formed in an upper surface cover portion of the tube connecting plate 31 for covering the upper surface of the tank forming member 30 to a side cover portion of the plate 31 for covering a side face of the member 30. The amount of condensation water to be collected on the top surface of the lower tank 3 can be diminished.



PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*